

In order to establish a prima facie case of obviousness, all of the claimed limitations must be taught or suggested by the prior art. Applicant respectfully submits that the combination of Osamura and Abe fails to disclose each element of the claimed invention. For example, Applicant submits that the combination fails to teach or suggest a second discharge member arranged on an end surface of a ground electrode having a surface which confronts a side surface of a first discharge member arranged at an end of a central bar electrode.

Figs. 1-2B illustrate an exemplary embodiment of the present invention which supports the above claimed feature. In particular, Figs. 1-2B illustrate a spark plug having a ground electrode 40 having an end surface 41 confronting a side surface 35 of a first bar discharge member 32. The first bar discharge member 32 is connected to a central bar electrode 30. A second discharge member 42 is connected to the end surface 41 of ground electrode 40. A spark discharge is generated between a surface 34 of the second discharge member 42 and the side surface 35 of the first discharge member 32. The second discharge member 42 thus has a surface 34 confronting the side surface 35 of the first bar discharge member 32.

In contrast to the above claimed feature, the spark plug disclosed by Osamura includes a metal chip 6 (serving as a second discharge member) which does not confront the side surface of metal chip 5 (serving as a first discharge member). (See Fig. 2 of Osamura). The Office Action states,

“...Osamura discloses a spark plug with a tubular housing...a plate ground electrode (Fig. 2 element 4) being arranged at one end of

the tubular housing in a radial direction of the axis and having an end surface confronting a side surface of the first bar discharge member, and a second discharge member (Fig. 2 element 6) being arranged on the end surface and having a surface confronting the side surface of the first bar discharge member.” (See page 3, lines 9-19 of the Office Action).

Applicant respectfully disagrees with this characterization of Osamura.

In Osamura, ground electrode 4 does not have an end surface which confronts a side surface of metal chip 5 (serving as a first discharge member) connected to center electrode 3. Moreover, Osamura also does not disclose metal chip 6 (serving as the second discharge member) having a surface which confronts a side surface of metal chip 5 (serving as the first discharge member) connected to center electrode 3.

Abe fails to remedy any of the above described deficiencies of Osamura. Like Osamura, Abe fails to disclose a second discharge member having a surface confronting a side surface of a first discharge member or a ground electrode having an end surface confronting the side surface of the first discharge member. In particular, Abe discloses an end surface of a ground electrode 3 which does not confront a side surface of metal chip 6 (serving as a first discharge member) bonded to central electrode 2.

Accordingly, even if Abe and Osamura were combined as proposed by the Office Action, the combination would not have taught or suggested the claimed limitations discussed above. Moreover, the combination of Osamura and Abe would further fail to teach or suggest $|A-D|$ being equal to or lower than a result of adding 0.5 mm to G, where G is the distance of the gap between first and second discharge members, D is the width of a side surface of the first

discharge member in a normal direction of a plane including a radial direction of an axis of a center electrode connected to the first discharge member, and A is the width of the surface of the second discharge member confronting the side surface of the first bar discharge member in the normal direction.

Accordingly, Applicant respectfully submits that claims 1, 2 and 7 are not “obvious” over Osamura and Abe and therefore respectfully requests that the rejection of these claims under 35 U.S.C. §103 be withdrawn.

Claims 3-4 were rejected under 35 U.S.C. §103 as allegedly being unpatentable over Osamura in view of Abe, and further in view of Yamaguchi et al (U.S. ‘103, hereinafter “Yamaguchi ‘103”). Claims 5 and 6 were rejected under 35 U.S.C. §103 as allegedly being unpatentable over Osamura in view of Abe, and further in view of Yamaguchi et al (JP ‘734, hereinafter “Yamaguchi ‘734”). Applicant respectfully traverses these rejections. Since claims 3-6 depend at least indirectly from claim 1, all of the above comments with respect to the combination of Osamura and Abe apply equally to claims 3-6. Neither Yamaguchi ‘103 nor Yamaguchi ‘734 remedy all of the above described deficiencies of the combination of Osamura and Abe. Applicant therefore respectfully requests that the rejection of claims 3-6 under 35 U.S.C. §103 be withdrawn.

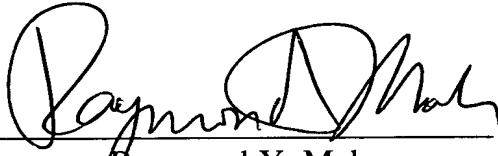
Conclusion:

Applicant believes that this entire application is in condition for allowance and respectfully requests a notice to this effect. If the Examiner has

any questions or believes that an interview would further prosecution of this application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE SPECIFICATION:

Paragraph beginning at page 4, line 26 has been amended as follows:

The spark plug according to this embodiment is used for a gas engine for an electric generator in a cogeneration system for example. Fig. 1 shows a side elevation view, partly in cross section, of a side electrode type of spark plug 100 according to the invention. The side electrode type of spark plugs have a central electrode 30 [20] and a ground electrode 40 arranged on the side of the central electrode 30 [20], wherein spark discharge occurs across their gap extending in a substantially perpendicular direction to the axis of the central [center] electrode 30.

Paragraph beginning at page 6, line 17 has been amended as follows:

At the one end 12 of the housing 10, two ground electrodes 40 are fixed to the housing 10 by means of welding or the like in a radial direction RD of the axis AX. These ground electrodes 40 includes a Ni alloy or Fe alloy of the like. In this embodiment, the ground electrode 40 has a post shape of which section is [a] rectangular. An end (end surface) 41 of the ground electrode 40 opposite to one end 12 of the housing 10 confronts the side surface 35 of the first discharge member 32. These ground electrodes 40 are arranged at the opposite positions on the circular shape of the end 12, so that the first discharge member 32 on the central [center] electrode 30 [32] is arranged between these ground electrodes 40 with spark gaps 50.

Paragraph beginning at page 7, line 12 has been amended as follows:

Each of the first and second discharge members 32 and 42 mainly includes Ir and at least one of Rh (rhodium), Pt, Ru (ruthenium), Pd (palladium), and W(tungsten) is added thereto. In this embodiment, each of the first and second discharge members 32 and 42 includes Ir alloy including 90% Ir and 10% Rh by weight (hereinafter, this alloy is referred to as Ir-10Rh).

Paragraph beginning at page 10, line 20 has been amended as follows:

Moreover, the inventor experimentally discovered that it is favorable to make the absolute $|A-D|$ equal to or lower than the result of adding 0.5 mm to the gap G from studying the relation between the sizes of the first and second discharge members 32 and 42 and the range of spark discharge (discharge width T in the normal direction ND on the surface of the second discharge member 42). An example [This feature is not essential in this invention but this example] will be described.